

What is claimed is:

1. A laser detection device that is responsive to a product indication signal to determine if a laser has emitted a laser beam towards a product, comprising:
a laser beam detector that generates a laser beam detection signal in response
5 to the laser emitting the laser beam;
a controller that accepts as inputs the product indication signal and said laser beam detection signal; and
said controller configured to determine whether the laser emitted the laser beam in proper relation to the product indication signal.

2. The laser detection device of claim 1, wherein said laser beam detector comprises a thermal sensor.

3. The laser detection device of claim 2, wherein said thermal sensor further comprises a thermal switch.

4. The laser detection device of claim 2, wherein said thermal sensor is configured to detect a hot to cold temperature transition.

5. The laser detection device of claim 2, wherein said thermal sensor is configured to detect a cold to hot temperature transition.

6. The laser detection device of claim 1, wherein said laser beam detector comprises optical emitter and detector.

7. The laser detection device of claim 6, wherein said optical emitter emits an infrared spectrum.

8. The laser detection device of claim 7, wherein the infrared spectrum is emitted through a transparent window on said optical emitter.

9. The laser detection device of claim 7, wherein the emitted infrared spectrum is received through a transparent window on said optical detector.

10. The laser detection device of claim 1, wherein said laser beam detector is optical detector.

11. The laser detection device of claim 1, wherein said laser beam detector is comprised of a thermocouple.

12. The laser detection device of claim 11, wherein said thermocouple is coupled to a transparent material wherein said laser beam passes through said transparent material and causes thermocouple to detect a change in heat.

13. The laser detection device of claim 1, wherein said laser beam detector is comprised of a sonic emitter and detector.

14. The laser detection device of claim 1, wherein said inputs to said controller are
5 optically isolated.

15. The laser detection device of claim 1, wherein said controller generates an error output signal if the laser beam was not emitted in proper relation to the product indication signal.

16. The laser detection device of claim 15, wherein said error output signal is optically isolated from said inputs to said controller.

17. The laser detection device of claim 15, wherein said controller comprises a
15 counter that is responsive to the product indication signal to count the number of products likely marked by said laser beam.

18. The laser detection device of claim 17, wherein said counter is coupled to the clock of a flip-flop, and wherein the product indication signal increments said counter
20 and said laser beam detection signal resets said flip-flop, and wherein said flip-flop generates said error output signal if said flip-flop changes state.

19. The laser detection device of claim 18, wherein said flip-flop is comprised from the group consisting of a J-K flip-flop and a R-S flip-flop.

20. The laser detection device of claim 17, wherein said controller further comprises
5 a second counter that is responsive to said laser beam detection signal.

21. The laser detection device of claim 20, wherein said controller generates an error output signal if said first counter and said second counter differ by more than a threshold count.

22. The laser detection device of claim 21, wherein said threshold count is 4.

23. The laser detection device of claim 21, wherein said threshold count is configurable.

24. The laser detection device of claim 20, wherein said first and second counters are clocks wherein said controller measures the time difference between the value in said first counter and said second counter and generates said error output signal if said time difference is greater than a threshold time.

25. The laser detection device of claim 24, wherein said threshold time is between around about 50 milliseconds and around about 1 second.

26. The laser detection device of claim 24, wherein said threshold time is configurable.

27. The laser detection device of claim 1, wherein said product indicator comprises a product indicator sensor that is capable of physically detecting the product.

28. The laser detection device of claim 1, wherein said product indicator comprises a signal indicative of the movement speed of the products.

29. The laser detection device of claim 28, wherein said product indicator is a clock signal generated in relation to the speed of movement of said products.

30. The laser detection device of claim 1, wherein said controller detects a lower than normal power rating in said laser if said laser beam signal

31. The laser detection device of claim 1, wherein said laser beam detection signal indicates an attenuation of said laser beam.

32. A laser detection system for marking a product with a laser emitting a laser beam, comprising:

a product indicator that produces a product indication signal when the product is detected and causes the laser to emit the laser beam onto the product;

a laser beam detector that generates a laser beam detection signal in response to said laser beam;

a controller that accepts as inputs said product indication signal and said laser beam detection signal; and

5 said controller configured to determine whether the laser emitted the laser beam in proper relation to said product indication signal.

33. The laser detection system of claim 32, wherein said laser beam detector comprises a thermal sensor.

34. The laser detection system of claim 33, wherein said thermal sensor further comprises a thermal switch.

35. The laser detection system of claim 33, wherein said thermal sensor is
15 configured to detect a hot to cold temperature transition.

36. The laser detection system of claim 33, wherein said thermal sensor is configured to detect a cold to hot temperature transition.

20 37. The laser detection system of claim 32, wherein said laser beam detector comprises an optical emitter and detector.

38. The laser detection system of claim 37, wherein said optical emitter emits an infrared spectrum.

39. The laser detection system of claim 38, wherein the infrared spectrum is emitted
5 through a transparent window on said optical emitter.

40. The laser detection system of claim 38, wherein the infrared spectrum is received through a transparent window on said optical detector.

41. The laser detection system of claim 32, wherein said laser beam detector
10 comprises an optical detector.

42. The laser detection system of claim 32, wherein said laser beam detector
15 comprises a thermocouple.

43. The laser detection system of claim 42, wherein said thermocouple is coupled to
a transparent material wherein said laser beam passes through said transparent
material and causes thermocouple to detect a change in heat.

20 44. The laser detection system of claim 32, wherein said laser beam detector
comprises a sonic emitter and detector.

45. The laser detection system of claim 32, wherein said inputs to said controller are optically isolated.

46. The laser detection system of claim 32, wherein said controller generates an error output signal if the laser beam was not emitted in proper relation to said product indication signal.

47. The laser detection system of claim 46, wherein said error output signal is communicated to a customer interface.

48. The laser detection system of claim 46, wherein said error output signal is communicated to an assembly line controller that controls the transport of the products.

49. The laser detection system of claim 48, wherein said assembly line controller stops the transport of products upon receipt of said error output signal.

50. The laser detection system of claim 48, wherein said assembly line controller communicates an alarm to a remote system when said error output signal is received.

51. The laser detection system of claim 46, wherein said error output signal is optically isolated from said inputs to said controller.

52. The laser detection system of claim 46, wherein said controller comprises a counter that is responsive to said product indication signal to count the number of products likely marked by said laser beam.

5 53. The laser detection system of claim 52, wherein said counter is coupled to the clock of a flip-flop, and wherein said product indication signal increments said counter and said laser beam detection signal resets said flip-flop, and wherein said flip-flop generates said error output signal if said flip-flop changes state.

10 54. The laser detection system of claim 53, wherein said flip-flop is comprised from the group consisting of a J-K flip-flop, a R-S flip-flop, and a D flip-flop.

15 55. The laser detection system of claim 52, wherein said controller further comprises a second counter that is responsive to said laser beam detection signal.

20 56. The laser detection system of claim 55, wherein said controller generates an error output signal if said first counter and said second counter differ by more than a threshold count.

57. The laser detection system of claim 56, wherein said threshold count is 4.

58. The laser detection system of claim 56, wherein said threshold count is configurable.

59. The laser detection system of claim 55, wherein said first and second counters are clocks wherein said controller measures the time difference between said first counter and said second counter and generates said error output signal if said time difference is greater than a threshold time.

60. The laser detection system of claim 59, wherein said threshold time is between around about 50 milliseconds to around about 1 second.

61. The laser detection system of claim 59, wherein said threshold time is configurable.

62. The laser detection system of claim 52, wherein said error output signal is communicated to a customer interface and said counter inside said customer interface.

63. The laser detection system of claim 62, wherein said customer interface is coupled to a central controller.

64. A laser detection system for marking a product, comprising:

a product indicator that produces a product indication signal when the product is detected;

a laser that emits a laser beam onto the product in response to said product indication signal;

a laser detector that generates a laser beam detection signal in response to said laser beam;

a controller that accepts as inputs said product indication signal and said laser beam detection signal; and

5 said controller configured to determine whether said laser emitted said laser beam in proper relation to said product indication signal.

65. A method for detecting if a marking laser has emitted a laser beam towards a product, comprising:

10 generating a product indication signal when said product is proximate to a marking laser;

activating the marking laser to emit a laser beam onto said product; and

detecting whether said laser beam was emitted by the marking laser.

15 66. The method of claim 65, wherein said detecting comprises detecting a heat change in said laser beam.

67. The method of claim 66, wherein said detecting further comprises:

emitting an optical signal across said laser beam on one side of said laser beam;

20 and

detecting said optical signal on the opposite side of said laser beam.

68. The method of claim 66, further comprising generating an error output signal if said laser beam was not emitted by said laser in proper relation to said product indication signal.

5 69. The method of claim 68, further comprising communicating said error output signal to a remote system.

70. The method of claim 68, further comprising:
transporting said product in an assembly line; and
10 stopping the transport of the product when said error output signal is generated.

71. The method of claim 68, further comprising communicating said error output signal to a customer interface.

15 72. The method of claim 65, wherein said detecting further comprises generating a laser beam detection signal when said laser beam is emitted from said laser.

73. The method of claim 72, further comprising counting said laser beam detection signal to determine the number of products likely marked by said laser beam.

20 74. The method of claim 72, further comprising counting the number of products likely marked by counting said error output signals and counting said product indication signals and subtracting said error output signals from said product indication signals.

75. The method of claim 72, further comprising:

counting said product indication signals;

counting said laser beam detection signals; and

5 generating an error output signal if the number of said product indication signals and number of said laser beam detection signals are different by more than a threshold value.

76. The method of claim 72, further comprising:

10 counting said product indication signals using a counter;

resetting said counter with said laser beam detection signals; and

generating an error output signal if said counter has a value greater than a threshold value.

15 77. The method of claim 72, further comprising:

storing the time when said product indication signal is generated;

storing the time when said laser beam detection signal is generated; and

generating an error output signal if the difference between the time for said product indication signal and the time for said laser beam detection signal differs by
20 more than a threshold value.